ALLEN-BRADLEY
BULLETIN 1203-SM1
ENHANCED MODE

APPLICATION NOTE# SM1 - 2

May 27, 1997

PURPOSE

The purpose of this document is to provide guidelines for wiring and control schemes for SCANport devices including Bulletin 1305 and 1336 PLUS AC Drives. This document is a suggestion only. Users must ensure that installations meet applicable codes and are suitable for the existing conditions.

WHAT THIS NOTE CONTAINS

This document contains information and an example ladder program that demonstrate how to control three 1305 drives using an SLC-5/03 and a 1203-SM1 module. This note uses the 1203-SM1 configured as an enhanced mode module. The 1203-SM1 can be used with an SLC 5/02, 5/03, or 5/04 processor in this configuration.

INTENDED AUDIENCE

This application note should be used by personnel familiar with the hardware components and programming procedures necessary to operate SCANport devices. It is also assumed that the user has some familiarity with the SLC-500 and ladder programming.

WHERE IT IS USED

The diagrams, parameter settings and auxiliary hardware used in this application note are designed to address specific issues in many different applications. Some changes by the user may be necessary to apply the concepts of this document to a specific application.

APPLICATION CONSIDERATIONS

These example ladder programs were written to be simple and clear examples. Consult the SLC and 1203-SM1 manuals for more information.

When used as an enhanced mode module, the 1203-SM1 extends the model used by the basic mode configuration. The enhanced mode configuration adds:

- Datalinks
- Safe State Data
- Messaging

If these functions are not required OR to aid in understanding the differences between the two configurations refer to the application note “Bulletin 1203-SM1 Basic Mode”.

This application note does not explain messaging. For more information on messaging refer to the application note “Bulletin 1203-SM1 SCANport Messaging”.

SCANport devices may assign different meanings to bits in the Logic Command and Status words. The usage of the Reference and Feedback words may also vary. Consult the manual for your SCANport device for more information.

SLC CONFIGURATION

The screen prints in Figures 1 and 2 show the configuration of the SLC system for the example program. Figure 3 explains how the “G” file is used in the 1203-SM1 module.

As is shown in Figure 1, the SLC rack is configured with a 1203-SM1 module installed in the first slot. A 1747-IA16 module is installed in slot 2 and a 1747-OV8 module is installed in slot 3. The module ID code for the 1203-SM1 is 13616 when used as an enhanced mode module.

```
+------------------- SLC-500 ADVANCED PROGRAMMING SOFTWARE -------[  OFFLINE ]-+
|+- PROGRAM DIRECTORY FOR PROCESSOR: SM1_AP2  ---- SINGLE STEP TEST: ENABLED  -+
||+- I/O CONFIGURATION FOR:SM1_AP2    ----------------------------------------+
|||  RACK 1 =       1746-A4   4-slot Backplane                                |
|||  RACK 2 =       NOT INSTALLED                                             |
|||  RACK 3 =       NOT INSTALLED                                             |
|||                                                                           |
||||    SLOT       CATALOG #     CARD DESCRIPTION                             |
||||   *  0        1747-L532   5/03 CPU -12K USER MEMORY                      |
||||   *  1        OTHER      I/O Module - ID code = 13616                    |
||||   *  2        1746-IA16  16-Input 100/120 VAC                            |
||||   *  3        1746-OV8    8-Output [TRANS](SINK)10/50 VDC                |
||||      4                                                                    |
||||      5                                                                    |
||||      6                                                                    |
||||      7                                                                    |
||||      8                                                                    |
+++- ESC exits ---------------------------------------------------------------+

offline               SLC 5/03                                    File SM1_AP2
 READ   ONLINE          MODIFY  MODIFY  DELETE   UNDEL   EXIT    SPIO
CONFIG  CONFIG           RACKS   SLOT    SLOT    SLOT           CONFIG
  F1      F2             F4      F5      F6      F7      F8      F9
```

Figure 1 -- SLC Configuration

Figure 2 shows the information that should be displayed by APS software if the module ID code for the 1203-SM1 is set to the correct value of 13616 for use as an enhanced mode module. The M0 Length, M1 Length and 'G' File Size all need to be set manually using this APS screen.

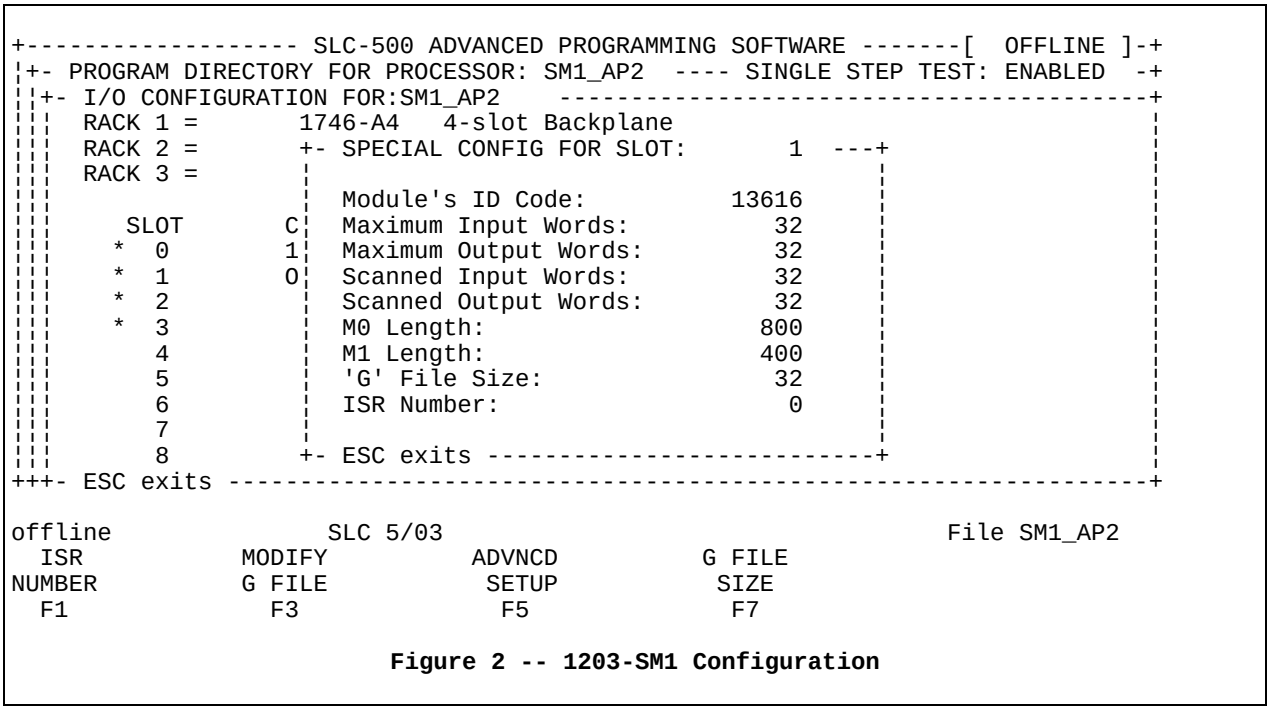
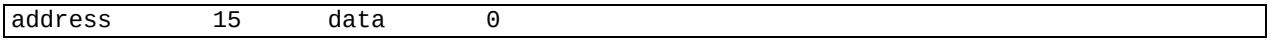


Figure 2 -- 1203-SM1 Configuration

Figure 3 shows the configuration of the 'G' file for the 1203-SM1 module. The first word is set by APS and should not be modified. Each bit in the second word enables a Datalink. Refer to the manual for your SCANport device for more information about Datalinks.

Each remaining word in the 'G' file contains Safe State Data. This is the data that will be sent to the attached SCANport device(s) if the 1203-SM1 dip switch is configured to use Safe State Data and the SLC becomes faulted or is changed to program mode.



```
G1:0            0000 0000 0000 0000     Reserved (Used by SLC)
G1:1            0000 0000 0000 0000     Datalink Enables
                |||| |||| |||| ||||
                ++++ |||| |||| |||+--- Channel 1 Datalink A Enable
                  |  |||| |||| ||+---- Channel 1 Datalink B Enable
                  |  |||| |||| |+----- Channel 1 Datalink C Enable
                  |  |||| |||| +------ Channel 1 Datalink D Enable
                  |  |||| ||||
                  |  |||| |||+-------- Channel 2 Datalink A Enable
                  |  |||| ||+--------- Channel 2 Datalink B Enable
                  |  |||| |+---------- Channel 2 Datalink C Enable
                  |  |||| +----------- Channel 2 Datalink D Enable
                  |  ||||
                  |  |||+------------- Channel 3 Datalink A Enable
                  |  ||+-------------- Channel 3 Datalink B Enable
                  |  |+--------------- Channel 3 Datalink C Enable
                  |  +---------------- Channel 3 Datalink D Enable
                  |
                  +------------------- Not Used

G1:2            0000 0000 0000 0000     Safe State Data - Channel 1 Logic Command
G1:3            0000 0000 0000 0000     Safe State Data - Channel 1 Reference
G1:4            0000 0000 0000 0000     Safe State Data - Channel 2 Logic Command
G1:5            0000 0000 0000 0000     Safe State Data - Channel 2 Reference
G1:6            0000 0000 0000 0000     Safe State Data - Channel 3 Logic Command
G1:7            0000 0000 0000 0000     Safe State Data - Channel 3 Reference
G1:8            0000 0000 0000 0000     Safe State Data - Channel 1 Datalink A1
G1:9            0000 0000 0000 0000     Safe State Data - Channel 1 Datalink A2
G1:10           0000 0000 0000 0000     Safe State Data - Channel 1 Datalink B1
G1:11           0000 0000 0000 0000     Safe State Data - Channel 1 Datalink B2
G1:12           0000 0000 0000 0000     Safe State Data - Channel 1 Datalink C1
G1:13           0000 0000 0000 0000     Safe State Data - Channel 1 Datalink C2
G1:14           0000 0000 0000 0000     Safe State Data - Channel 1 Datalink D1
G1:15           0000 0000 0000 0000     Safe State Data - Channel 1 Datalink D2
G1:16           0000 0000 0000 0000     Safe State Data - Channel 2 Datalink A1
G1:17           0000 0000 0000 0000     Safe State Data - Channel 2 Datalink A2
G1:18           0000 0000 0000 0000     Safe State Data - Channel 2 Datalink B1
G1:19           0000 0000 0000 0000     Safe State Data - Channel 2 Datalink B2
G1:20           0000 0000 0000 0000     Safe State Data - Channel 2 Datalink C1
G1:21           0000 0000 0000 0000     Safe State Data - Channel 2 Datalink C2
G1:22           0000 0000 0000 0000     Safe State Data - Channel 2 Datalink D1
G1:23           0000 0000 0000 0000     Safe State Data - Channel 2 Datalink D2
G1:24           0000 0000 0000 0000     Safe State Data - Channel 3 Datalink A1
G1:25           0000 0000 0000 0000     Safe State Data - Channel 3 Datalink A2
G1:26           0000 0000 0000 0000     Safe State Data - Channel 3 Datalink B1
G1:27           0000 0000 0000 0000     Safe State Data - Channel 3 Datalink B2
G1:28           0000 0000 0000 0000     Safe State Data - Channel 3 Datalink C1
G1:29           0000 0000 0000 0000     Safe State Data - Channel 3 Datalink C2
G1:30           0000 0000 0000 0000     Safe State Data - Channel 3 Datalink D1
G1:31           0000 0000 0000 0000     Safe State Data - Channel 3 Datalink D2
```

Figure 3 -- “G” file use

DATALINKS

A Datalink is a type of pointer used by some SCANport devices to transfer information between the SLC and the device. Datalinks allow a parameter value to be changed without using the 1203-SM1 messaging function.

SCANport devices that support this function have a group of parameters for Datalink configuration. These parameters are identified as “Data In” and “Data Out” parameters. Datalinks are enabled by bits in the first word of the 1203-SM1 “G” file (refer to the section on “G” file configuration).

Each Datalink provides two words of input and two words of output when enabled.

A simple Datalink application is to set a parameter number into one of the “Data In” parameters. The SLC output image word for that Datalink will then control the value of that parameter.

For example: On a 1336 PLUS drive connected to channel 1 of a 1203-SM1 module installed in slot 1 use Datalink A1 to control the value of Parameter 27. First, set the lowest bit of the second word of the “G” file to a 1 (enables Datalink A on channel 1). Use a HIM to set parameter 111 (Data In A1) to “27”. The value in O:1.8 will now control the value of parameter 27 in the 1336 PLUS drive.

A similar Datalink application is to set a parameter number into one of the “Data Out” parameters. The value of that parameter will then appear in the SLC input image word for that parameter.

For example: On a 1336 PLUS drive connected to channel 1 of a 1203-SM1 module installed in slot 1 use Datalink A1 to monitor the value of Parameter 27. First, set the lowest bit of the second word of the “G” file to a 1 (enables Datalink A on channel 1). Use a HIM to set parameter 119 (Data In A1) to “27”. The value in I:1.8 will now monitor the value of parameter 27 in the 1336 PLUS drive.

Ladder Program

SCANport Channel Enables

The section of program shown in Figure 4 enables all three SCANport channels on the 1203-SM1 module.

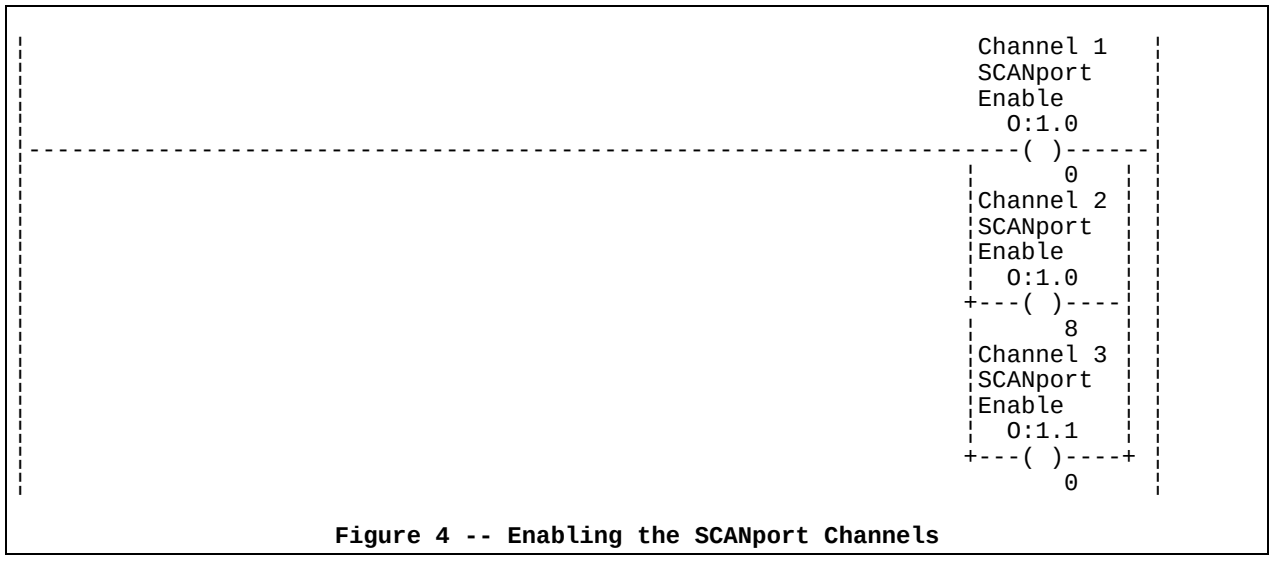


Figure 4 -- Enabling the SCANport Channels

Ladder Program

Drive 1 Start/Stop and Reference

The section of program shown in Figure 5 provides start/stop control and a frequency reference to the 1305 drive connected to SCANport channel 1.

The User Start is a normally open pushbutton while the User Stop is a normally closed pushbutton.

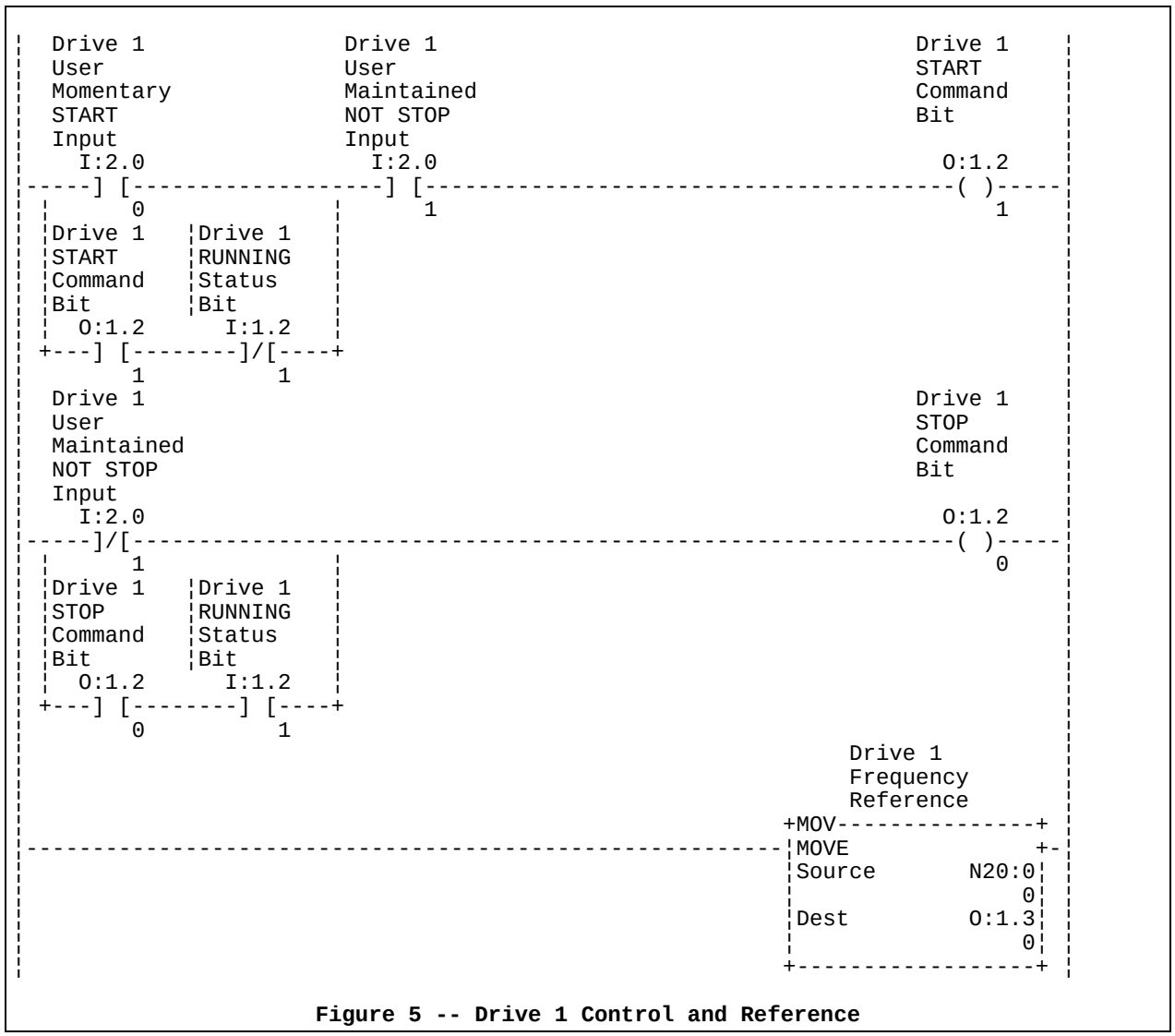


Figure 5 -- Drive 1 Control and Reference

Ladder Program

Drive 2 Start/Stop and Reference

The section of program shown in Figure 6 provides start/stop control and a frequency reference to the 1305 drive connected to SCANport channel 2. This section functions identically to that shown in Figure 5 except for the changes in addresses.

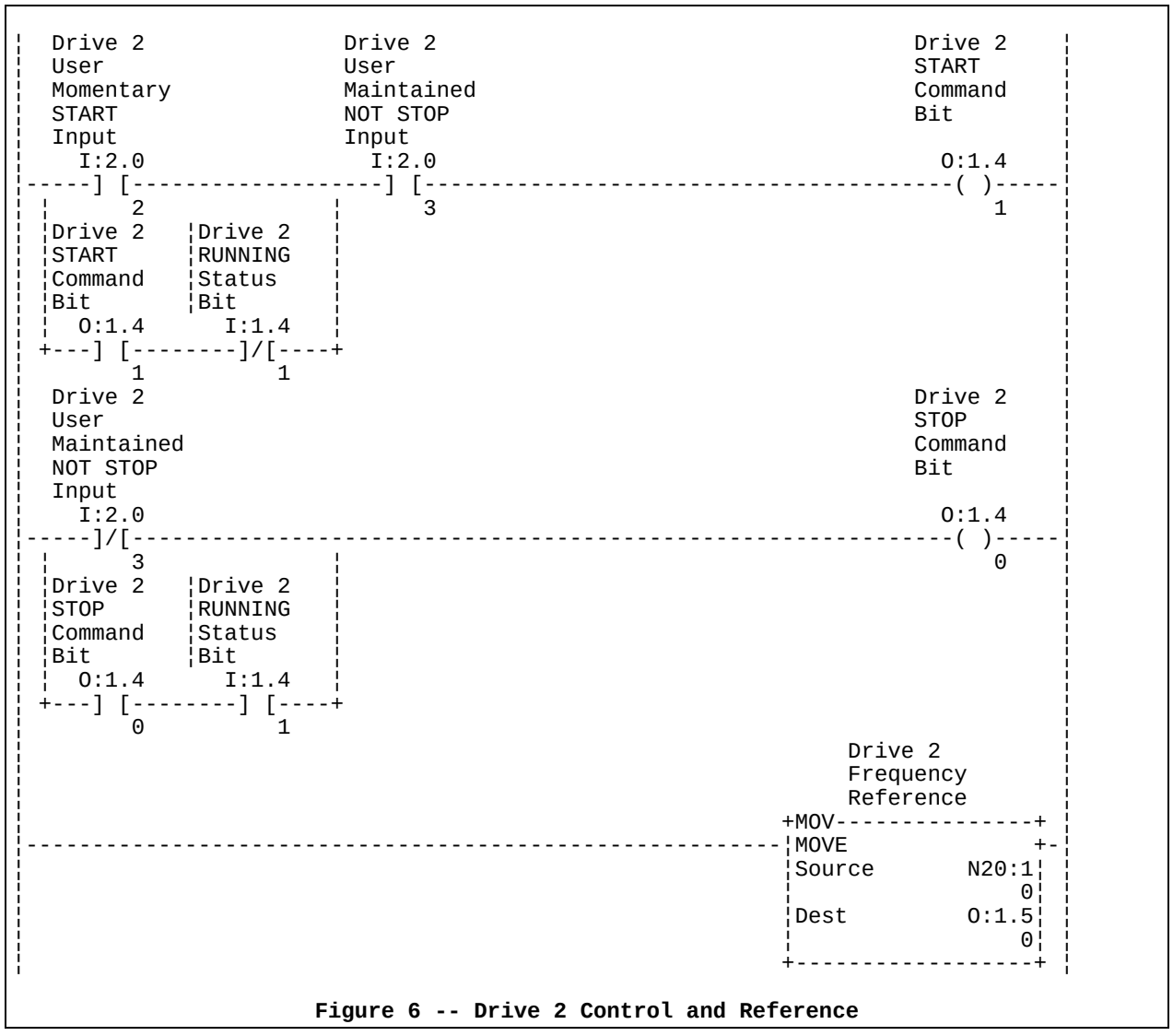


Figure 6 -- Drive 2 Control and Reference

Ladder Program

Drive 3 Start/Stop and Reference

The section of program shown in Figure 7 provides start/stop control and a frequency reference to the 1305 drive connected to SCANport channel 3. This section functions identically to that shown in Figure 6 except for the changes in addresses.

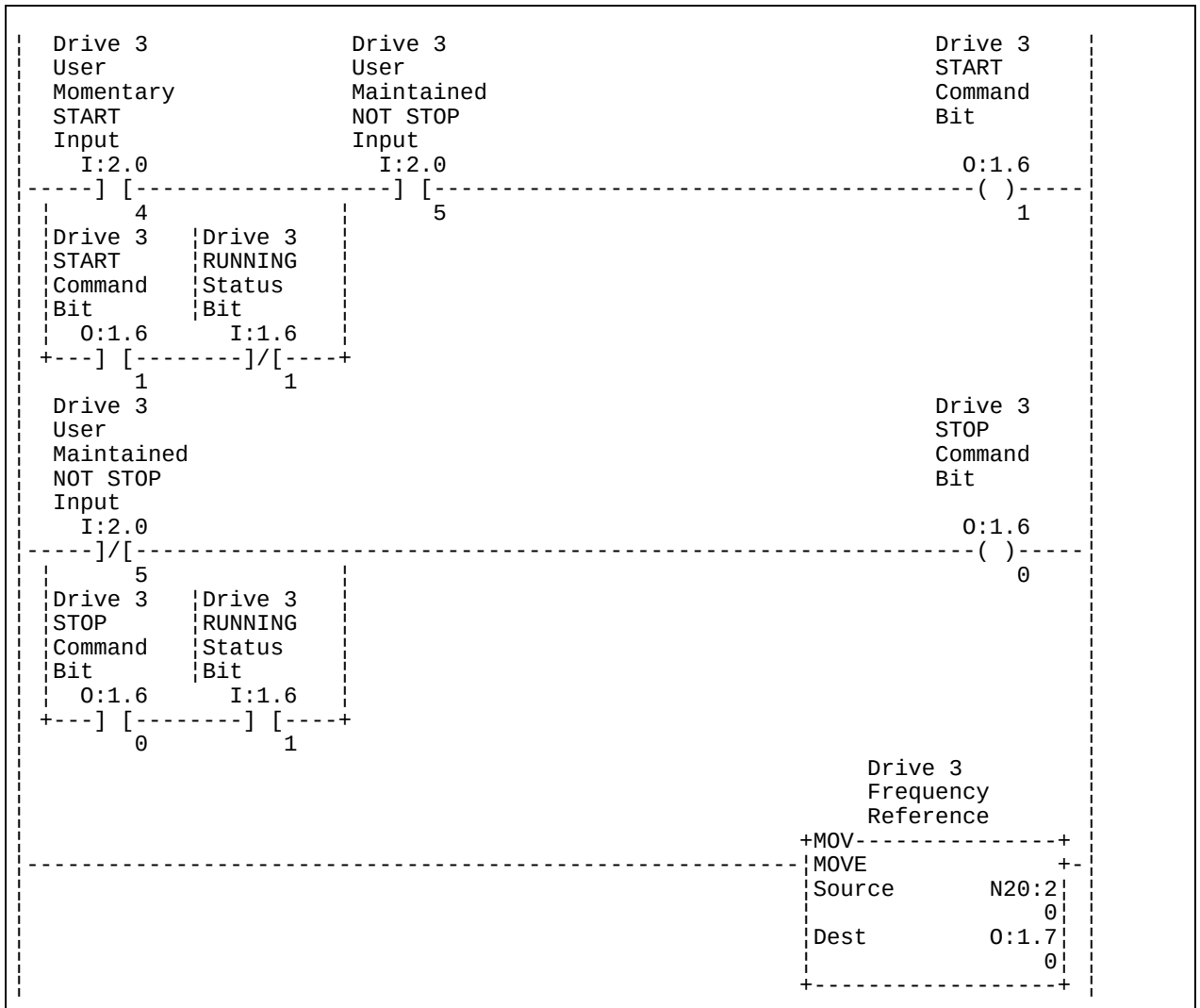


Figure 7 -- Drive 3 Control and Reference

Input Data Table File

The data table file shown in Figure 8 is the input data read from the 1203-SM1 via the SLC backplane.

```
address       15      data       0
I:1               0000 0000 0000 0000    SCANport Channels 1 & 2 Channel Status
I:1.1             0000 0000 0000 0000    SCANport Channel 3 Channel Status
I:1.2             0000 0000 0000 0000    SCANport Channel 1 Logic Status
I:1.3             0000 0000 0000 0000    SCANport Channel 1 Feedback
I:1.4             0000 0000 0000 0000    SCANport Channel 2 Logic Status
I:1.5             0000 0000 0000 0000    SCANport Channel 2 Feedback
I:1.6             0000 0000 0000 0000    SCANport Channel 3 Logic Status
I:1.7             0000 0000 0000 0000    SCANport Channel 3 Feedback
I:1.8             0000 0000 0000 0000    SCANport Channel 1 Datalink A1 Out
I:1.9             0000 0000 0000 0000    SCANport Channel 1 Datalink A2 Out
I:1.10            0000 0000 0000 0000    SCANport Channel 1 Datalink B1 Out
I:1.11            0000 0000 0000 0000    SCANport Channel 1 Datalink B2 Out
I:1.12            0000 0000 0000 0000    SCANport Channel 1 Datalink C1 Out
I:1.13            0000 0000 0000 0000    SCANport Channel 1 Datalink C2 Out
I:1.14            0000 0000 0000 0000    SCANport Channel 1 Datalink D1 Out
I:1.15            0000 0000 0000 0000    SCANport Channel 1 Datalink D2 Out
I:1.16            0000 0000 0000 0000    SCANport Channel 2 Datalink A1 Out
I:1.17            0000 0000 0000 0000    SCANport Channel 2 Datalink A2 Out
I:1.18            0000 0000 0000 0000    SCANport Channel 2 Datalink B1 Out
I:1.19            0000 0000 0000 0000    SCANport Channel 2 Datalink B2 Out
I:1.20            0000 0000 0000 0000    SCANport Channel 2 Datalink C1 Out
I:1.21            0000 0000 0000 0000    SCANport Channel 2 Datalink C2 Out
I:1.22            0000 0000 0000 0000    SCANport Channel 2 Datalink D1 Out
I:1.23            0000 0000 0000 0000    SCANport Channel 2 Datalink D2 Out
I:1.24            0000 0000 0000 0000    SCANport Channel 3 Datalink A1 Out
I:1.25            0000 0000 0000 0000    SCANport Channel 3 Datalink A2 Out
I:1.26            0000 0000 0000 0000    SCANport Channel 3 Datalink B1 Out
I:1.27            0000 0000 0000 0000    SCANport Channel 3 Datalink B2 Out
I:1.28            0000 0000 0000 0000    SCANport Channel 3 Datalink C1 Out
I:1.29            0000 0000 0000 0000    SCANport Channel 3 Datalink C2 Out
I:1.30            0000 0000 0000 0000    SCANport Channel 3 Datalink D1 Out
I:1.31            0000 0000 0000 0000    SCANport Channel 3 Datalink D2 Out
```

Figure 8 -- Input Data Table File

Channel & Message Status Input Image Definitions

Channel 2 Status **Channel 1 Status**

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
	D2	C2	B2	A2	V2		ID2		D1	C1	B1	A1	V1		ID1		Word 0
	X	M0 STA	MSTAT CH 3		MSTAT CH 2		MSTAT CH 1		D3	C3	B3	A3	V3		ID3		Word 1

Message Status Ch 1-3 **Channel 3 Status**

NOTE: x = Designated SCANport Channel Number on the module.

IDx SCANport Channel x Connected Adapter Port ID Number. This three (3) bit field contains the adapter port number that channel x is connected to on the SCANport product. It should contain a value between 1-7. If this field contains a seven (7), then the channel is not connected to the SCANport product, or the SCANport product may not be powered.

Vx SCANport Channel x Valid Data bit. When high (1), the Logic Status and Analog Feedback values are valid and can be used. When low (0), the values should not be considered valid.

A-Dx SCANport Channel x Datalink A-D Valid Data bit. When high (1) the data associated Datalink A-D of the corresponding channel is valid and can be used. When low (0) the values should not be considered valid.

M0 STAT M0-File Status bit. When high (1), any previously written M0-file message to the module can be enabled by the SLC program. When low (0), the SLC to SCANport module is either actively reading the last sent M0_file data changes, or no M0_file data has been loaded into the module by the SLC program. Under SLC program control, any changes to the M0-file message buffers should cause the checking of this status bit before enabling that message to be sent out any SCANport channel. Unchanged buffers can still be enabled or sent while this status bit is low (0).

MSTAT CHx Message Status bits for the message buffer of the corresponding channel. These two (2) bit fields correspond to the status of each of the message buffers. There is one message response buffer for each channel. The first bit (MSB) contains the READY bit. The READY bit is active (high=1) when a new message request can be initiated to the SCANport product. The second bit (LSB) contains the DONE bit. The DONE bit is active (high=1) when an M1-file message buffer contains response data to a message request. When both the READY and the DONE bits are inactive (0), the buffer is in a BUSY state. This is the state during which the module is actually requesting the data from the SCANport product. These status bits should never be high at the same time.

NOTE: The 1203-SM1 can be used to read and write parameters and other information in a SCANport device. For more information refer to the application note “Bulletin 1203-SM1 SCANport Messaging”.

Output Data Table File

The data table file shown in Figure 9 is the data to be sent to the 1203-SM1 via the SLC backplane.

```
address       15      data       0
O:1              0000 0000 0000 0000    SCANport Channels 1 & 2 Channel Command
O:1.1            0000 0000 0000 0000    SCANport Channel 3 Channel Command
O:1.2            0000 0000 0000 0000    SCANport Channel 1 Logic Command
O:1.3            0000 0000 0000 0000    SCANport Channel 1 Reference
O:1.4            0000 0000 0000 0000    SCANport Channel 2 Logic Command
O:1.5            0000 0000 0000 0000    SCANport Channel 2 Reference
O:1.6            0000 0000 0000 0000    SCANport Channel 3 Logic Command
O:1.7            0000 0000 0000 0000    SCANport Channel 3 Reference
O:1.8            0000 0000 0000 0000    SCANport Channel 1 Datalink A1 In
O:1.9            0000 0000 0000 0000    SCANport Channel 1 Datalink A2 In
O:1.10           0000 0000 0000 0000    SCANport Channel 1 Datalink B1 In
O:1.11           0000 0000 0000 0000    SCANport Channel 1 Datalink B2 In
O:1.12           0000 0000 0000 0000    SCANport Channel 1 Datalink C1 In
O:1.13           0000 0000 0000 0000    SCANport Channel 1 Datalink C2 In
O:1.14           0000 0000 0000 0000    SCANport Channel 1 Datalink D1 In
O:1.15           0000 0000 0000 0000    SCANport Channel 1 Datalink D2 In
O:1.16           0000 0000 0000 0000    SCANport Channel 2 Datalink A1 In
O:1.17           0000 0000 0000 0000    SCANport Channel 2 Datalink A2 In
O:1.18           0000 0000 0000 0000    SCANport Channel 2 Datalink B1 In
O:1.19           0000 0000 0000 0000    SCANport Channel 2 Datalink B2 In
O:1.20           0000 0000 0000 0000    SCANport Channel 2 Datalink C1 In
O:1.21           0000 0000 0000 0000    SCANport Channel 2 Datalink C2 In
O:1.22           0000 0000 0000 0000    SCANport Channel 2 Datalink D1 In
O:1.23           0000 0000 0000 0000    SCANport Channel 2 Datalink D2 In
O:1.24           0000 0000 0000 0000    SCANport Channel 3 Datalink A1 In
O:1.25           0000 0000 0000 0000    SCANport Channel 3 Datalink A2 In
O:1.26           0000 0000 0000 0000    SCANport Channel 3 Datalink B1 In
O:1.27           0000 0000 0000 0000    SCANport Channel 3 Datalink B2 In
O:1.28           0000 0000 0000 0000    SCANport Channel 3 Datalink C1 In
O:1.29           0000 0000 0000 0000    SCANport Channel 3 Datalink C2 In
O:1.30           0000 0000 0000 0000    SCANport Channel 3 Datalink D1 In
O:1.31           0000 0000 0000 0000    SCANport Channel 3 Datalink D2 In
```

Figure 9 -- Output Data Table File

Channel Command Output Image Definitions

Channel 2 Command **Channel 1 Command**

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
	Not Used			MSG ID			ME 2	DE 2	Not Used			MSG ID			ME 1	DE 1	Word 0
	Reserved								Not Used			MSG ID			ME 3	DE 3	Word 1

Channel 3 Command

NOTE: x = Designated SCANport Channel Number on the module.

DEx SCANport Channel x Data Enable bit. While low (0), the Channel will not be actively transferring I/O data (including datalink data) between the connected SCANport product. When high (1), the Channel will become active to the SCANport product and transfer the appropriate I/O data. When reset to low (0), the Channel will disconnect from the SCANport product. NOTE: This will usually cause the connected SCANport product to fault.

MEx SCANport Channel x Message Enable bit. When set high (1), the message selected by the Message ID field will be transmitted through the appropriate channel to the SCANport product. This bit should be held high during the duration of the request until the status DONE bit is asserted (1). The resetting (0) of this bit clears the DONE status, and returns the message status to the READY state.

MSG ID Message Identifier field. This field allows for the selection of one of the eight (8) message buffers in the M0-file area for each channel. Multiple channels can utilize the same Message ID buffer simultaneously.

NOTE: The 1203-SM1 can be used to read and write parameters and other information in a SCANport device. For more information refer to the application note “Bulletin 1203-SM1 SCANport Messaging”.